



Los Alamos studies perovskites for efficient optoelectronics

March 9, 2017



In the eternal search for next generation high-efficiency solar cells and LEDs, scientists at Los Alamos National Laboratory and their partners are gaining an extra degree of freedom in designing and fabricating efficient optoelectronic devices based on 2D layered hybrid perovskites. Industrial applications could include low cost solar cells, LEDs, laser diodes, detectors, and other nano-optoelectronic devices.

The 2D, near-single-crystalline “Ruddlesden-Popper” thin films have an out-of-plane orientation so that uninhibited charge transport occurs through the perovskite layers in planar devices. The new research finds the existence of “layer-edge-states” at the edges of the perovskite layers which are key to both high efficiency of solar cells (greater than 12 percent) and high fluorescence efficiency (a few tens of percent) for LEDs. The spontaneous conversion of excitons (bound electron-hole pairs) to free carriers via these layer-edge states appears to be the key to the improvement of the photovoltaic and light-emitting thin film layered materials.

Los Alamos National Laboratory

www.lanl.gov

(505) 667-7000

Los Alamos, NM

Operated by Los Alamos National Security, LLC for the Department of Energy's NNSA

